Supplementary Material

# Supplementary Data

*At the Antwerp University Hospital, Belgium, the Dutch Society for Audiology list (NVA) was used as monosyllable test and the Leuven Intelligibility Sentence Test (LIST) was used as sentences in noise test (1, 2).*

* Dutch Society for Audiology list (NVA)
* The Dutch open-set NVA lists were developed by the Nederlandse Vereniging voor Audiologie (NVA) or Dutch Society for Audiology (1). Each of its 15 lists includes 12 monosyllabic words (consonant-vowel-consonant), of which one is a training item. One list was presented at 65 dB SPL in quiet in free field. The percentage of correctly identified phonemes of this list represented the speech perception score in quiet.
* Leuven Intelligibility Sentence Test (LIST)
* Speech in noise was assessed using the LIST, which is a speech-in-noise test developed for use in severely hearing impaired persons, consisting of 35 lists of 10 sentences (2). One list was presented with a noise level fixed at 65 dB SPL and the speech level was adapted to the participants’ responses. The speech level of the next sentence was reduced with 2 dB SPL if participants were able to identify all bold keywords of the current sentence correctly, if not, the speech level of the next sentence was increased with 2 dB SPL. The Speech Reception Threshold (SRT) was calculated by averaging the level of the last 5 sentences together with the level of the imaginary 11th sentence of the list.

*The Consonant-Nucleus-Consonant test was utilized as monosyllable test and the Bamford-Kowal-Bench Speech in Noise test as sentences in noise test in the Fiona Stanley Fremantle Hospital Group, Australia (3, 4).*

* Consonant-Nucleus-Consonant (CNC) test
* The ten CNC word lists were used in the management of cochlear implant users. Each word list consists of 50 phonetically balanced monosyllabic words and was designed to identify how well an cochlear implant user recognizes a spoken word (5). One point was given to the subject per correct word said, with the total percentage being derived after all 50 words have been presented (6). Words were presented at a fixed presentation level of 65 dB HL and the test was performed in quiet (7).
* Bamford-Kowal-Bench Speech in Noise (BKB-SIN) test
* The BKB-SIN test was developed for determining if patients are suitable for cochlear implantation (8). The test consists of 18 list sentence pairs which have basic semantic and syntax context that is played simultaneously with babble (noise) that increases in loudness after each sentence, thereby increasing the signal to noise ratio (SNR). In this study, list pairs 1-8 were used, including 10 sentences per list, with one sentence at each SNR of: +21, +18, +15, +12, +9, +6, +3, 0, -3 and -6 dB. Speech was presented at 65 dB SPL. Each sentence has key words and one point was given for each key word repeated correctly. The final score represented the SNR for which the subject would get 50% of the key words correct.

*The clinic and polyclinic for Head-, Neck- and Ear Disorders of the University of Würzburg used the Freiburger monosyllabic test (Freiburger Einsilber) and the Oldenburger Satztest (OLSA) (9).*

* Freiburger monosyllables
* This open-set monosyllabic word test is widely used to test adults in German-speaking countries (10). It consists in total of 20 lists with 20 words each. Each patient performed one list (list 1) for training purposes before the start of the actual testing. The results that were scored in this training session were not analyzed. For the actual test, each patient was given 2 lists. These lists were allocated according to a randomization grouping procedure. The analysis evaluated the number of correctly repeated words in % correct at a fixed presentation level. Speech was presented at 65dB SPL in free field. The test was performed in quiet .
* Oldenburg Matrix Sentence Test (OLSA)
* The Oldenburg Matrix Sentence Test (OLSA) is a sentence test similar to the Swedish test proposed by Hagerman (11). This test was used to assess the 50% speech-recognition threshold (SRT50 in dB), which is a measure of the level difference at which speech can be identified half the time in the presence of a simultaneous masking noise. The sentences are composed with the same structure (e.g. in English: subject, verb, numeral adjective, object like “Hannah wins twelve red tins”). Test lists with 20 items are generated from several such sentences. The words are taken in a seemingly random fashion from an inventory (a matrix) of 50 words (10 words per category). The Oldenburg Sentence Test (OLSA) is the German Matrix Test. Speech was presented at 65dB SPL in free field, the masking noise level was adaptive.

*In the La Paz University Hospital, Spain, speech perception was assessed via verbal perception test of disyllable words in quiet and the Spanish version of the “Every day sentences test” (CID) in noise in free field. The tests were done without lip reading, at 65dB SPL, and with a signal/noise ratio of 10dB SPL s-noise below the signal.*

* Disyllable words test
* The disyllable words are phonetically balanced words belonging to the everyday vocabulary; it is composed of 20 lists with 25 words. The words appear in the list with the same proportion as in the spoken language (>20%). The test was developed by Cárdenas de and Marrero (12). Speech was presented at 65 dB SPL.
* Spanish CID
* This test consists of 100 sentences distributed in 10 lists that patients have to repeat without any visual or graphic help. The responses are valued by counting each of the underlined key words the sentences are composed of. The results are presented as percentages. The test is an adaptation to the Spanish language of the "Every day sentences test" (CID). It has been carried out by the ENT Department of the University of Navarra (following the guidelines and supervision of J. Moog and A. Geers of the "Central Institute for the Deaf" (St. Louis, USA) (13). Speech was presented at 65 dB SPL and with a signal/noise ratio of 10dB SPL-noise below the signal.

*Speech audiometry in quiet and in noise was performed using the Pruszewicz monosyllable test at the Institute of Physiology and Pathology of Hearing of the World Hearing Center in Poland.*

* Pruszewicz monosyllable test
* The Pruszewicz monosyllable test consists of 10 lists, each containing 20 words. Each patient shall perform one list. The analysis evaluates the number of correctly repeated words in % correct at a fixed presentation level. The test shall be performed in quiet and in noise. Speech was presented at 65dB SPL (in quiet and in noise), noise was presented at 55dB SPL. (14, 15)

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